In re Application of: Sean Boerner
Group Art Unit: 3628
Serial No: 09/815,360
Filed: 3/22/2001 Examiner: Nguyen, Nga B
For: Method and System to Identify Discrete Trends in Time Series

---

Commissioner of Patents and Trademarks
P.O. Box 1450
Arlington, VA 22313-1450

BRIEF OF APPELLANT

This is an appeal from the final rejection of all claims of the Examiner dated February 20, 2009 rejecting claims 1-25, all of the pending claims in the case. The Brief is accompanied by the requisite fee of $270 as set forth in §41.20(b)(2). A petition and fee for a 1-month extension of time to file the brief is filed concurrently on EFS-WEB.

REAL PARTY IN INTEREST

This patent application is not assigned, and Applicant Sean Boerner remains the real party in interest.

RELATED APPEALS AND INTERFERRENCES

There are no related U.S. appeals, interferences, or judicial proceedings.

STATUS OF CLAIMS

The application was filed on March 22, 2001 as a new utility application with (26) twenty-six claims, of which (2) two were independent claims. (Claims 1 and 26).

All of the pending claims were rejected in a First Office Action dated July 5, 2005. Claims 1-26 were rejected under section §103 based on Matsuoka (U.S. Patent No. 5,956,702.

On October 5, 2005, in response to the First Office Action, Applicant amended claims 1-25 to be method claims, and corrected a clerical error in claim 26.

In the next and Final Office Action, the Examiner rejected all pending claims on February 28, 2006.

A Notice of Appeal was filed on June 26, 2006; and an Appeal Brief was filed on August 28, 2006. A corrected Brief was filed on November 2, 2006.

The prosecution was reopened, and a non-final rejection was mailed on February 27, 2007 rejecting all pending claims 1-26 as being unpatentable over Rebane, U.S. Patent No. 6,978,904 in view of Wallman, U.S. Patent No. 6,161,098.

Applicant responded on May 24, 2007.

A non-final rejection of claims 1-26 was mailed on August 21, 2007 citing a new grounds of rejections of all claims as being anticipated by Gatto 7,167,838.

Applicant responded on November 17, 2007.

A final rejection of claims 1-26 as being anticipated by Gatto 7,167,838 was mailed on February 11, 2008.

An interview was held on March 6, 2008.

Claims were amended on April 13, 2008.

An Advisory Action was mailed on May 1, 2008 refusing to enter the claims amendments.

A Request for continued Examination was filed on May 20, 2008.

A non-final rejection of claims 1-26 was mailed on August 4, 2008 rejecting claims 1-25 as non-statutory and rejecting claim 26 as unpatentable over Gatto 7,167,838.

Applicant amended claims on November 4, 2008 to cite a "computer system" rather than a "computer implemented method". Claim 26, which had cited a "system for use in an information processing apparatus" was withdrawn.

A final rejection of claims 1-25 as being directed to non-statutory subject matter and as unpatentable over Gatto 7,167,838.

A notice of Appeal was filed on June 22, 2009.

The status of the claims as set out in the Final Office action was and is as follows:

allowed claims: none

claims objected to: none

Claims rejected: 1-25

STATUS OF AMENDMENTS

On November 4, 2008 Applicant submitted amendments to claims 1-25 to be system claims. No other amendments have been proposed or entered.

SUMMARY OF CLAIMED SUBJECT MATTER

Overview

The current invention relates to a system for performing trend analysis. The system of the current invention is applied to a single series of data that have been constantly sampled in time or space to determine when trends end, and whether a data point represents a continuation of a previous trend. The system is not limited to a time series of stock market data. For example, the system can be applied to finding geologic sequences from well logs, because those sequences have sharp geologic boundaries. The sequences can be approximated with trend lines that have a start and end.

Claims References

The following annotated claims indicate figure and reference numbers and/or specification discussion of the claims elements [page:line(s) format]. The claims themselves are generally self-explanatory unless otherwise noted.

1. (Previously Amended) A computer system for breaking a time series into a plurality of discontinuous trends, the system comprising:

an input means (FIG. 4a, #410) for inputting time series data to a computer, the time series comprising a plurality of data elements, at least a portion of which represents a trend which is generally increasing or decreasing (FIG. 2, #110 ; 8:10-21);

a memory means (FIG. 1, #100-400) for storing the time series data;

a processing means (FIGs. 2-4) for

selecting a plurality of sets of trend determination parameters for the time series, each set of trend determination parameters comprising at least one window size, such that the window size defines a number of adjacent data elements from the time series to be used to generate trends (FIG. 1, #300 ; 13:15 to 15:3);

selecting a useful group of sets of trend determination parameters for the time series from the plurality of sets of trend determination parameters, such that the useful group of sets includes at least one member (11:4-11 ; 27:20-23);

processing the time series with each member of the useful group of sets of trend determination parameters to generate a set of trends and trend attributes for each member(FIG. 1, #400 ; FIG. 4a, 4b; 15:5 to 24:5; 28:1 to 32:16);

evaluating the trend attributes for each member;

selecting at least one set of trends; and

an output means (FIG. 1, #600) for outputting the set of trends from the computer (FIG. 1, #600 ; 21:7).

2. (Previously Amended) The system of claim 1 wherein the processing means further comprises

deciding, based on the composite results of a plurality of the members of the useful group of sets of trend determination parameters, whether the newest data element of the time series represents a continuation of a trend, such that the trend is increasing, decreasing, or flat (15:10-11).

3. (Previously Amended) The system of claim 1 wherein inputting time series data to a computer further comprises

inputting a plurality of time series data sets to ~~a~~ the computer (9:2); and

selecting a particular time series from a plurality of time series data sets (9:5).

4. (Previously Amended) The system of claim 1 wherein inputting time series data to a computer further comprises

inputting a plurality of vector datasets to the computer (25:13-14); and

selecting a particular vector data set from a plurality of time series data sets (25:17-18).

5. (Previously Amended) The system of claim 3 wherein selecting a particular time series from a plurality of time series data sets further comprises

for each of the plurality of time series data sets:

selecting at least a portion of the elements in the data set to create a selected data subset (9:6);

normalizing the selected data subset to generate a normalized subset for the time series (9:6);

storing the normalized subset on the computer;

calculating, on a processor, the slope of a best-fit polynomial regression through the normalized subset (9:15-16); and

selecting a particular time series that has a large absolute slope and a large correlation coefficient between the trend and the data elements (10:2-3).

6. (Previously Amended) The system of claim 1 wherein the processing means further comprises

specifying a range of values for each of a plurality of trend determination parameters; and

generating the sets of trend determination parameters by selecting unique combinations of trend determination parameter values, such that the values are within the range of values for each of the plurality of trend determination parameters. (11:12-19)

7. (Previously Amended) The system of claim 6 wherein specifying a range of values for each of a plurality of trend determination parameters further comprises

specifying a minimum value for a first trend determination parameter of initial data window size;

specifying a maximum value for a first trend determination parameter of initial data window size;

specifying a minimum value for a second trend determination parameter of deviation limit; and

specifying a maximum value for a second trend determination parameter of deviation limit. (11:12-19)

8. (Previously Amended) The system of claim 1 wherein the processing means further comprises

specifying a range of potential values for each of a plurality of trend determination parameters;

creating an objective function from at least one indications of trend results, such that the objective function generates a resultant value for a set of trend determination parameters; and

selecting a useful group of sets of trend determination parameters by applying an optimization procedure to the objective function and the range of potential values for each of the plurality of trend determination parameters. (42:9 to 43:6)

9. (Previously Amended) The system of claim 1 wherein selecting a useful group of sets of trend determination parameters for the time series from the plurality of sets of time series parameters further comprises

for each trend determination parameter set:

applying the trend determination parameters to at least a portion of the time series data elements, thereby generating at least one trend and at least one trend attribute parameter;

identifying the dynamic trend and at least one dynamic trend attribute parameter.

calculating at least one indication of trend results between the time series and the trend set; and storing at least one indication of trend results on the computer; and

selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets. (13:15 to 15:2)

10. (Previously Amended) The system of claim 9 wherein applying the trend determination parameters to at least a portion of the time series data elements thereby generating at least one trend and at least one trend attribute parameter further comprises

assigning each of the data elements to at least one trend by generating a first trend with at least a portion of the data elements;

identifying the first trend as the current trend;

evaluating each subsequent data element to determine whether the data element is a continuation of the current trend, and assigning the data element to the current trend if it is a continuation of the current trend, and assigning the data element to a new trend if it is not continuation of the current trend, and identifying the new trend as the current trend; and

determining at least one trend attribute for each trend. (15:4 to 22:14)

11. (Previously Amended) The system of claim 9 wherein calculating at least one indication of trend results between the time series and trend set further comprises

calculating at least one measure from the group consisting of: the number of trends in the subset of the time series, the RMS Error between the input data values and trend values, the average trend length; the average trend length divided by the minimum number of data points needed to define a trend (window size parameter), the average percent return of the trends, the summed cumulative percent return of the trends; the fraction of correct predictions, the fraction of incorrect predictions, the quotient of the root mean square error and the average length of the trends divided by the minimum number of data points needed to define a trend, and the RMS error*L_s the efficiency of the trends, where efficiency is defined as the average return of the trends divided by the average length of the trends, and compounded return of the trends. (22:15 to 23:14)

12. (Previously Amended) The system of claim 9 wherein selecting at least one set of

trend determination parameters based on at least one indication of trend results for each of the sets further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and its associated trend results, where a first axis represents a first measure of trend results and a second axis represents a second measure of trend results; (13:21-23) and

selecting from the graph at least one data point that represents a trend determination parameters set that has desirable trend results.

13. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the product of the root mean square error and the deviation limit for the set of trend determination parameters, and the x-axis represents the average trend length for the set of trend determination parameters (13:21-23); and

selecting at least one set of trend determination parameters associated with a point from the graph that has a minimum value for the product of the root mean square error and the deviation limit for a given average trend length. (14:5-6; FIG 6)

14. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the root mean square

error for the set of trend determination parameters, and x-axis represents the average trend length for the set of trend determination parameters (13:21-23); and

selecting at least one set of trend determination parameters associated with a point from the graph that has a minimum value for the root mean square error for a given average trend length. (14:5-6)

15. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the summed cumulative percent return of the trends for the set of trend determination parameters, and x-axis represents the average percent return for the set of trend determination parameters (13:9-10); and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the summed cumulative percent return and the average percent return.

16. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the summed cumulative percent return of the trends for the set of trend determination parameters, and x-axis represents the fraction of correct predictions for the set of trend determination parameters (13:1-3); and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the summed cumulative percent return and the fraction of correct predictions.

17. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the average percent return of the trends for the set of trend determination parameters, and x-axis represents the fraction of correct predictions for the set of trend determination parameters (12:22 ; 13:1-3); and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the average percent return and the fraction of correct predictions.

18. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the average percent return for the trends for the set of trend determination parameters, and x-axis represents the average trend length for the set of trend determination parameters; (12:21); and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for the average percent return for

a given average trend length.

19. (Previously Amended) The system of claim 9 wherein selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets further comprises

specifying an objective function that incorporates at least one measure of trend results, such that minimization of the objective function produces desirable trend results; applying an optimization technique to the objective function such that the optimization technique minimizes the objective function; and

selecting at least one set of trend determination parameters as a result of minimizing the objective function. (47:9 to 43:6)

20. (Previously Amended) The system of claim 1 wherein processing the time series with each member of the useful group of sets of trend determination parameters to generate a set of trends and trend attributes for each member further comprises

for each member applying the trend determination parameters to at least a portion of the time series data elements, thereby generating at least one trend and at least one trend attribute parameter (32:6-16); and

identifying the dynamic trend and at least one dynamic trend attribute parameter; and

storing at least one dynamic trend attribute parameter on the computer.

21. (Previously Amended) The system of claim 20 wherein applying the trend determination parameters to at least a portion of the time series data elements thereby generating at least one trend and at least one trend attribute parameter further comprises

assigning each of the data elements to at least one trend by generating a first trend with at least a portion of the data elements;

identifying the first trend as the current trend;

evaluating each subsequent data element to determine whether the data element is a continuation of the current trend, and assigning the data element to the current trend if it is a continuation of the current trend, and assigning the data element to

a new trend if it is not continuation of the current trend, and identifying the new trend as the current trend; and

determining at least one trend attribute for each trend. (32:6-16)

22. (Previously Amended) The system of claim 21 wherein generating a first trend with at least a portion of the data elements further comprises

recalling the first trend determination parameter, the data window size, from the set of trend determination parameters; forming a proposed trend data set by selecting a number of data elements from the time series, such that the number of data elements selected is at least as large as the value of the data window size trend determination parameter;

calculating a first best-fit curve through the proposed trend data set; and

identifying the best fit curve as the first trend. (15:10-15)

23. (Previously Amended) The system of claim 21 wherein evaluating each subsequent data element to determine whether the data element is a continuation of the current trend further comprises

forming a proposed trend data set from the selected data elements; calculating a new best-fit curve through the proposed trend data set; calculating at least one measure of predictive error for the new best-fit curve with respect to the values of the data elements in the proposed trend data set; projecting the best-fit curve to the location of the subsequent data element (15:10-15);

evaluating the deviation of the subsequent data element from the projected best-fit curve value at the new location; and

applying at least one acceptance criteria to the measure of predictive error, and if the acceptance criteria is met, setting the subsequent data element to the proposed trend data set, identifying the new best-fit curve as the current trend, and if the acceptance criteria is not met, setting the subsequent data element to a new trend set, determining a new trend, and identifying the new trend as the current trend.

24. (Previously Amended) The system of claim 23 wherein calculating at least one measure of predictive error for the new best-fit curve with respect to the values of the data elements in the proposed data set further comprises

evaluating the derivative of the best-fit curve;

obtaining an estimated value of the best-fit curve at the new element; calculating the residuals between the proposed trend data set and the new best-fit curve;

normalizing the residuals; quantifying the spread of the distribution of the normalized residuals (15:10-15);

calculating the deviation of predicted trend value at the new element from the actual value of the new element; and

normalizing the deviation of predicted trend value at the new element from the actual value of the new element using the spread of the distribution of normalized residuals.

25. (Previously Amended) The system of claim 23 wherein applying at least one acceptance criteria to the measure of predictive error further comprises

designating a first test criterion as true if the sign of the derivative of the trend curve generated through the proposed trend dataset changes compared to the sign of the derivative of the trend curve generated previously (47:14-15);

designating a second test criterion as true if the absolute value of normalized deviation exceeds the deviation limit parameter;

designating a third test criterion as true if the absolute value of normalized deviation exceeds the deviation limit parameter and the normalized deviation is in the opposite direction as the direction of the trend as designated by the derivative of the trend curve through the proposed trend dataset;

designating a fourth test criterion as true if the correlation coefficient between the proposed trend curve and the proposed trend dataset decreases below the correlation limit parameter;

designating a fifth test criterion as true if the number of times that the absolute value of normalized deviation exceeds the deviation limit parameter; and the normalized deviation is in the opposite direction as the direction of the trend as

designated by the derivative of the trend curve through the proposed trend dataset; exceeds the number of values parameter; (47:15-16)

designating a sixth test criterion as true if the absolute value of the normalized deviation from a flat trend exceeds the flat trend deviation limit (49:7-10); and

determining whether at least one of the first, second, third, fourth, fifth, and sixth test criteria is true.

26. (withdrawn)

GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL

1. The Examiner has rejected all pending claims 1-25 as being directed to non-statuatory subject matter under §101.
2. The Examiner has rejected all pending claims 1-25 under §112 for failing to disclose an input means, a memory means, and an output means.
3. The Examiner has rejected all pending claims 1-25 as being unpattentable over Gatto 7,167,838.

ARGUMENT

I. The claims are directed to statutory subject matter.

II. The claimed elements of an input means, a memory means, and an output means are disclosed in the specification.

The specification supports system claims:

> "The present invention relates to a computer-implemented system and method to process one or more time-series signals into representative piece-wise discrete trends." [1:6-7]

"In one embodiment a particular set or vector of time series may be input into to a processor for analysis." [4:6-7]

"… the processor may access and analyze multiple sets of time series data …" [4:8-9]

"… the selected time series is fed into the processor.."[4:14-15]

"… once the parameters have been selected, they are applied to the time series…"[4:21]

"Once the trends have been identified, the trends, the original time series, and other results are exported …" [4:8-9]

"once a time series data set has been selected and loaded in the processor, the trend determination parameters are selected…"[10:12-13] [26:16-17][40:2-3]

"The procedure preferably outputs the following arrays for each trend parameter set …'[21:7-8]

"in the claims, means-plus-function clauses are intended to cover the structures described herein as performing the recited function …"[52:13-14]

Drawings

Applicant argues that the current figures do illustrate "every feature of the invention specified in the claims. [A system comprising: an input means, a memory means, a processing means, and an output means."

- Input means: Element 410 of FIG. 4a includes an input means to load time series data.
- Memory means: Steps 100-400 in FIG. 1 require and include a memory means.

- Processing means: Steps 100-400 in FIG. 1require and include a processing means.
- Output means: Step 600 in FIG. 1 requires and includes an output means.

Applicant notes that the U.S. Supreme Court is expected to address relevant issues in the *In re Biliski* case during the pendency of this appeal. The Supreme Court is reviewing that case as a result of the recent use of Section 101 rejections by the Federal Circuit and USPTO. Applicant expects the Supreme Court ruling to clarify that claims in this application are proper subject matter.

III. Claims 1-25 are not unpatentable over Gatto 7,167,838.

Gatto does not describe or use trend analysis. In the final rejection, the examiner does not explain the relevance of Gatto except to suggest that Gatto or any prior art reference which had an input means, a memory means, a processing means, and an output means could be capable of performing the claimed invention.

Applicant argues that this is not a proper standard, and provides a detailed comparison of Gatto to the current invention to demonstrate why it would not be obvious to one skilled in the art to use Gatto to perform the claimed invention. Applicant argues that the Examiner has not established a proper case for an obviousness rejection.

1. Gatto describes a system for merging and analyzing security analysts' estimates for earnings. The goal is to derive more robust models for estimating a company's future earnings based on multiple analysts' estimates.

2. Gatto mentions trends in his patent, but only qualitatively and peripherally. The use of trends is more in relationship to trends in one or more analysts' predictions. There is no rigorous procedure to quantitatively parameterize a trend, much less deal with piecewise discontinuous trends.

3. Gatto does not quantitatively use trends of time series in his analysis. Analysts' historical performance is accounted for by the use of statistical measures, but there is nothing in Gatto that suggests calculating trends or using them in his method. Even if he were to do so, it is in relation to analysts' estimates of earnings, not to a time series.

4. There is very little similarity in Gatto and the current invention. The current application refers to trend analysis. The method is applied to a single series numbers that have been constantly sampled in time or space to determine when trends end. It is not limited to a time series of stock market data. For example, a method of the current invention can be applied to finding geologic sequences from well logs, because those sequences have sharp geologic boundaries. The sequences can be approximated with trend lines that have a start and end.

Claim 1

5. The examiner has previously cited Gatto Column #8, Lines 55-60 and column #11, Lines 10-50 as anticipating claim 1 element "…inputting time series data, the time series comprising a plurality of data elements, at least a portion of which represents a trend which is generally increasing or decreasing"

   In the first part (Column #8, Lines 55-60), Gatto discusses backtesting a model using the historical database and viewing the results of the backtest. In the next paragraph, he describes viewing historical estimates and data in a graphical format. The models he describes for backtesting are statistical models combining one or more security analyst(s)' estimates for a company's earnings. His software does not use security prices or constantly sampled time series except to visually compare to one or more analysts' earnings estimates.

   In the second part (Column #11, Lines 10-50, Gatto describes using a "History module" to display the analysts' estimates over a given time period in the past. This

can also be displayed as a grid of text information. The software that he describes can also show historical price stock information with the analyst(s)' estimates and revisions. The user of the software can also use the system to display a model with the analyst(s)' estimates.

There is nothing in either of these sections for dealing with a time series for trend analysis.

6. The examiner has previously cited Gatto Column #13, Lines 5-65 as anticipating claim 1 element "Selecting a plurality of sets of trend determination parameters".

This section describes charting one or more analyst(s)' estimates for earnings are displayed along with the actual earnings of the stock. The results of a model that combines one or more analyst(s)' earnings estimates can also be displayed. Gatto then goes on to describe in detail how a user of his software can pick one or more security analyst(s)' earnings estimates and the manner in which they are displayed. The user can also calculate simple univariate statistical measures from multiple analyst(s)' estimates, such as the high, low, "mean plus a standard deviation, a mean minus a standard deviation, and other calculated estimates". He describes the graphical display of the analyst(s)' earnings as a time series and how those might be displayed. He continues to describe how each earning's estimate would be displayed using a different color with a legend and how a discontinued estimate would be displayed. He also describes how the analyst(s)' estimates would be displayed with a model result.

Nothing in this list has anything to do with trend analysis or picking the parameters for determining trends.

7. The examiner has previously cited Gatto Column 12, lines 50-65 as anticipating claim 1 element "Selecting a useful group of sets of trend determination parameters for the

time series from the plurality of sets of trend determination parameters, such that the useful group of sets includes at least one member".

Here Gatto is describing clusters, how they are displayed, and how clusters could be formed from a combination of dates, analysts, cluster mean, and cluster standard deviation. He does mention the word "trends" in this section, but it is only in reference to qualitatively identifying trends from the displayed information. Otherwise, there is nothing in this section that would constitute selecting a group of trend determination parameters.

8. The examiner has previously cited Gatto Column #11, Lines 30-50 as anticipating claim 1 element "Processing the time series with each member of the useful group of sets of trend determination parameters to generate a set of trends and trend attributes for each member".

This section was previously referenced above. Nothing in this section has anything to do with processing a time series to generate a set of trends or trend attributes.

9. The examiner has previously cited Gatto Figure 12 and Column #15, line 35-60 as anticipating claim 1 element "Outputting the trends and trend attributes"

Figure 12 refers to a snapshot view, which is a view of a grid of text information. It allows the user to view various information with the estimates and other metrics that are current on that date.

Gatto then describes the information in Figure 12 in more detail in the rest of the section (Column #15, Lines 35-60). He also describes the weights that might be given to certain analysts or groups of analysts for estimating the securities' earnings.

There is nothing related to outputting trends or trend attributes.

Claim 2

10. The examiner has previously cited Gatto Column #8, Lines 55-60 and column #11, Lines 10-50 as anticipating claim 2 element of "deciding, based on the composite results of a plurality of the members of the useful group of sets of trend determination parameters, whether the newest data element of the time series represents a continuation of a trend such that the trend is increasing, decreasing or flat."

    This section was previously referenced above. Nothing in this section has anything to do with determining whether a trend continues or whether the trend is increasing, decreasing, or flat.

Claim 3

11. The examiner has previously cited Gatto Column #13, Lines 40-50 as anticipating claim 3 element of "inputting time series data further comprises inputting a plurality of time series data sets to a computer; and selecting a particular time series from a plurality of time series data sets."

    Here Gatto describes a time series and the method of displaying a time series, but the time series that he is describing are of analyst(s)' estimates. He does describe selecting a node on the time series to display further information. Gatto describes how discontinuities of a time series might be displayed. However, Gatto is not describing selecting a single time series from a plurality of time series datasets.

Claim 4

12. The examiner has previously cited Gatto Column #14, Lines 5-30 as anticipating claim 4 element of "inputting time series data further comprises inputting a plurality of vector datasets to a computer; and selecting a particular vector dataset from a plurality of time series data sets."

Gatto describes Figure 11 and how the user might select different time frames of the data to show. He is describing how an optional chart of stock prices could be displayed along with the analyst(s)' estimates in a graphical format. He also describes how the user might select options to save the data to a file or print the chart. Gatto's patent generally refers to displaying the data, analyst(s)' estimates, and other information for a single stock at a time.

Gatto does not describe inputting a plurality of vector datasets to a computer, and selecting a particular vector dataset from the time series data sets. In other words, this section does not describe picking one time series dataset from a plurality of time series datasets.

Claim 5

14. The examiner has previously cited Gatto Column #12, Lines 10-35 as anticipating claim 5 element of "selecting a particular time series from a plurality of time series data sets further comprises for each of the plurality of time series data sets: selecting at least a portion of the elements in the data set to create a selected data subset; normalizing the selected data subset to generate a normalized subset for the time series; storing the normalized subset on the computer; calculating, on a processor, the slope of a best-fit polynomial regression through the normalized subset; and selecting a particular time series that has a large absolute slope and a large correlation coefficient between the trend and the data elements.."

In this section, Gatto describes how the user might make a selection within the software that he is describing for the user to get more information about one or more

analysts over a particular time frame. The view will also display some simple univariate statistics on the analyst(s)' estimates for a particular date.

Gatto does not teach selecting a time series subset; normalizing the subset; storing the normalized subset on the computer; calculating, on a processor, the slope of a best-fit polynomial regression through the normalized subset; and selecting a particular time series that has a large absolute slope and a large correlation coefficient between the trend and the data elements.

Claim 6

15. The examiner has previously cited Gatto Column #12, Lines 10-35 as anticipating claim 6 element of "specifying a range of values for each of a plurality of trend determination parameters; and generating the sets of trend determination parameters by selecting unique combinations of trend determination parameter values, such that the values are within the range of values for each of the plurality of trend determination parameters."

This section was previously referenced. Nothing in this section has anything to do with trends or selecting trend determination parameters. Calculating trends from a series of numbers that are constantly sampled in time or space may have nothing to do with the earnings estimates of security analysts.

Claim 7

16. The examiner has previously cited Gatto Column #14, Lines 5-30 as anticipating claim7 element " wherein specifying a range of values for each of a plurality of trend determination parameters further comprises specifying a minimum value for a first trend determination parameter of initial data window size; specifying a maximum value for a first trend determination parameter of initial data window size; specifying a minimum value for a second trend determination parameter of deviation limit; and

specifying a maximum value for a second trend determination parameter of deviation limit."

This has been previously described. Here Gatto is describing Figure 11 and how the user might select different time frames of the data to show. He is describing how an optional chart of stock prices could be displayed along with the analysts' estimates in a graphical format. He also describes how the user might select options to save the data to a file or print the chart.

Gatto's patent generally refers to displaying the data, analysts' estimates, and other information for a ***single*** stock at a time.

In the current application, constraints are selected on a pair of parameters that will describe the minimum and maximum lengths of the trends and the minimum and maximum standard deviation limits that can be used to define a trend. Gatto's detailed description of how a user could use the software to display analysts' estimates of stock earnings over various time frames has nothing to do with picking trend determination parameters.

Claim 8

17. The examiner has previously cited Gatto Column #17-20 as anticipating claim 8 element of "specifying a range of potential values for each of a plurality of trend determination parameters; creating an objective function from at least one indications (sic) of trend results, such that the objective function generates a resultant value for a set of trend determination parameters; and selecting a useful group of sets of trend determination parameters by applying an optimization procedure to the objective function and the range of potential values for each of the plurality of trend determination perimeters (sic)."

In these sections, Gatto describes the method of building statistical models of analysts' estimates of earnings. He describes the factors that can be used to filter the analysts and be used to build the models. He does not build models for trend determination. He mentions the word "trends" only once in this section (Column #20, Line #10), whereby the user can use cluster to define meaningful trends. Here trends are used qualitatively and in passing. The purpose of Gatto's patent is NOT for trend analysis. It is not clear whether Gatto uses any type of optimization procedure in building the models. It seems to be more of trial and error on the part of the user.

There is nothing in Gatto that has anything to do with quantitatively identifying and defining trends. He does not calculate them. He does not use them. He builds models of analysts' estimates of a company's earnings, not of evenly spaced time series of numbers that may or may not be security related. In my patent application, I am computing and optimizing the parameters that generate quantitative, non-linear, piecewise discontinuous trends.

Claim 9

18. The examiner has previously cited Gatto Column #12, Lines 50-65 as anticipating claim 9 element " wherein selecting a useful group of sets of trend determination parameters for the time series from the plurality of sets of time series parameters further comprises for each trend determination parameter set: applying the trend determination parameters to at least a portion of the time series data elements, thereby generating at least one trend and at least one trend attribute parameter; identifying the dynamic trend and at least one dynamic trend attribute parameter; calculating at least one indication of trend results between the time series and the trend set; and storing at least one indication of trend results on the computer; and selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets."

This section was previously referenced. In this section, Gatto describes clusters, how they are displayed, and how clusters could be formed from a combination of dates, analysts, cluster mean, and cluster standard deviation. He does mention the word "trends" in this section, but it is only in reference to qualitatively and visually identifying trends from the displayed information. There is no quantitative analysis of any type of trend in Gatto's patent.

The preceding description in Gatto's patent has nothing to do with the following described in the current application:

- Selecting the parameters that will control how the trends are to be generated on a time series
- Generating the trends on a subset of the time series based on the selected parameters and thus, generating trend attributes
- Calculating any statistics between the time series subset and the trend
- Storing the trend parameters and attributes on the computer
- Selecting one or more sets of trend parameters based on the results of multiple tests of trend determination parameters

Claim 10

19. The examiner has previously cited Gatto Columns #11-12 as anticipating claim 10 element "wherein applying the trend determination parameters to at least a portion of the time series data elements thereby generating at least one trend and at least one trend attribute parameter further comprises: assigning each of the data elements to at least one trend by generating a first trend with at least a portion of the data elements; identifying the first trend as the current trend; evaluating each subsequent data element to determine whether the data element is a continuation of the current trend, and assigning the data element to the current trend if it is a continuation of the current trend, and assigning the data element to a new trend if it is not (sic) continuation of

the current trend, and identifying the new trend as the current trend; and determining at least one trend attribute for each trend."

In this section, Gatto describes the "History" module of his software and how it can display various types of information, such as the analyst(s)' prediction, actual earnings, univariate statistics of analyst(s)' estimates of earnings, models of earnings, and other data about the analyst(s) whose earnings are being displayed.

This section does not relate to the following described in the current patent application:

- Applying the trend determination parameters to a portion of the time series
- Generating at least one trend and trend attribute
- Assigning each of the data elements (numbers) to at least one trend by
  - Generating a first trend with at least a portion of the data elements (numbers).
  - Identifying the first trend as the current trend
  - Evaluating each subsequent data element (number) to determine whether it is a continuation of the trend or not
    - Assigning it to the trend if it is
    - Starting a new trend if it isn't. If it isn't, then:
      - Start a new trend with this data element.
      - Identify the new trend as the current trend
      - Calculate at least one trend attribute for this new trend.

This procedure of calculating trends has very little to do with Gatto's models of analysts' earnings estimates, and there is no teaching of applying the present invention's trend analysis application to earning's estimates.

Claim 11

20. The examiner has previously cited Gatto Figure 34 and Column #39, Lines 12-65 as anticipating claim 11 element "wherein calculating at least one indication of trend results between the time series and trend set further comprises: calculating at last (sic) one measure from the group consisting of: the number of trends in the subsets of the time series, the RMS Error between the input data values and trend values, the average trend length; the average trend length divided by the minimum number of data points needed to define a trend (window size parameter), the average percent return of the trends, the summed cumulative percent return of the trends; the fraction of correct predictions, the fraction of incorrect predictions, the quotient of the root mean square error and the average length of the trends divided by the minimum number of data points needed to define a trend, and the RMS error, the efficiency of the trends, where efficiency is defined as the average return of the trends divided by the average length of the tends (sic), and the compounded return of the tends (sic)."

    This section describes the method of calculating the bias error between the analysts' estimates and the consensus estimate.

    This has nothing to do with calculating trend parameters, trend results, or any other measure of trends.

Claim 12

21. The examiner has previously cited Gatto Figures 9 – 11 as anticipating claim 12 element "wherein selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets further comprises plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and its associated trend results, where a first axis represents a first measure of trend results and a second axis represents a second measure of trend results; and selecting from the graph at least one data point that represents a trend determination parameters set that has desirable trend results."

Gatto's Figures 9-11 refer to displays of analyst(s)'s estimates or earnings, models of earnings' estimates, actual earnings, and the view of the corresponding price chart of the stock which is being analyzed.

None of this refers to crossplots of trend parameters or trend results.

Claim 13

22. The examiner has previously cited Gatto Figure 34 as anticipating claim 13 element "wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters (sic) set that has desirable trend results further comprises: plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the product of the root mean square error and the deviation limit for the set of trend determination parameters, and the x-axis represents the average trend length for the set of trend determination parameters; and selecting at least one set of trend determination parameters associated with a point from the graph that has a minimum value for the product of the root mean square error and the deviation limit for a given average trend length."

Gatto's Figure 34 is of the estimated number of days prior to an event versus the error relative to the consensus of analysis for earning's estimates.

The current invention crossplot refers specifically to finding and selecting parameters to be used in calculating trends. Gatto's patent uses a crossplot to display earning's estimates.

Gatto's patent does not teach calculating trends, using trends, or displaying trend statistics, parameters, or results in a crossplot. Gatto's crossplot is different from the crossplot of the current invention.

Claim 14

23. The examiner has previously cited Gatto Figure 34 as anticipating claim 14 element "wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters (sic) set that has desirable trend results further comprises: plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the root mean square error for the set of trend determination parameters, and the x-axis represents the average trend length for the set of trend determination parameters; and selecting at least one set of trend determination parameters associated with a point from the graph that has a minimum value for the root mean square error for a given average trend length."

Figure 34 was discussed in the previous section.

The crossplot of the present invention refers to finding and selecting parameters to be used in calculating trends. Gatto's patent uses a crossplot to display earning's estimates.

Gatto's patent has nothing to do with calculating trends, using trends, or displaying trend statistics, parameters, or results in a crossplot. Gatto's use of a crossplot is different from the current invention.

Claim 15

24. The examiner has previously cited Gatto Figures 9-11 as anticipating claim 15 element "wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters (sic) set that has desirable trend results further comprises: plotting on a graph a

representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the summed cumulative percent return of the trends for the set of trend determination parameters, and the x-axis represents the average percent return for the set of trend determination parameters; and selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the summed cumulative percent return and the average percent return."

Gatto's Figures 9-11 refer to displays of analysts' estimates or earnings, models of earnings' estimates, actual earnings, and the view of the corresponding price chart of the stock which is being analyzed.

These figures do not relate to crossplots of trend parameters or trend results.

Claim 16

25. The examiner has previously cited Gatto Figures 9-11 as anticipating claim 16 element "wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters (sic) set that has desirable trend results further comprises: plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the summed cumulative percent return of the trends for the set of trend determination parameters, and the x-axis represents the action (sic) of correct predictions for the set of trend determination parameters; and selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the summed cumulative percent return and the fraction of correct predictions."

Gatto's Figures 9-11 refer to displays of analysts' estimates or earnings, models of earnings' estimates, actual earnings, and the view of the corresponding price chart of the stock which is being analyzed.

Figures 9-11 do not refer to crossplots of trend parameters or trend results.

Claim 17

26. The examiner has previously cited Gatto Figures 9-11 as anticipating claim 17 element "wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters (sic) set that has desirable trend results further comprises: plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the average percent return of the trends for the set of trend determination parameters, and the x-axis represents the fraction of correct predictions for the set of trend determination parameters; and selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the average percent return and the fraction of correct predictions."

Gatto's Figures 9-11 refer to displays of analysts' estimates or earnings, models of earnings' estimates, actual earnings, and the view of the corresponding price chart of the stock which is being analyzed.

Figures 9-11 do not refer to crossplots of trend parameters or trend results.

Claim 18

27. The examiner has previously cited Gatto Figures 9-11 as anticipating claim 18 element "wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results

and selecting from the graph at least one data point that represents a parameters (sic) set that has desirable trend results further comprises: plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the average percent return of the trends for the set of trend determination parameters, and the x-axis represents the average trend length for the set of trend determination parameters; and selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for the average percent return for a given average trend length."

Gatto's Figures 9-11 refer to displays of analysts' estimates or earnings, models of earnings' estimates, actual earnings, and the view of the corresponding price chart of the stock which is being analyzed.

Figures 9-11 do not refer to crossplots of trend parameters or trend results.

Claim 19.

28. The examiner has previously cited Gatto Columns 17-20 as anticipating claim19 element "wherein selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets further comprises: specifying an objective function that incorporates at least one measure of trend results, such that minimization of the objective function produces desirable trend results' (sic); applying an optimization technique to the objective function such that the optimization technique minimizes the objective function and selecting at least one set of trend determination parameters as a result of minimizing the objective function."

In these sections, Gatto describes the method of building statistical models of analysts' estimates of earnings. He describes the factors that can be used to filter the analysts and be used to build the models. He does not build models for trend determination. Actually, he mentions the word "trends" only once in this section

(Column #20, Line #10), whereby the user can use cluster to define meaningful trends. Here trends are used qualitatively and in passing. The purpose of Gatto's patent is not for trend analysis. It is not clear whether Gatto uses any type of optimization procedure in building the models. It seems to be more of trial and error on the part of the user.

There is nothing in Gatto that quantitatively has anything to do with trends. He does not calculate them. He does not use them. The current application teaches optimizing the parameters that generate the trends. Optimization procedures are used in myriad applications. The optimization that we are covering under this claim refer to optimizing the parameters that control the trends on a series of numbers in time or space.

Claim 20

29. The examiner has previously cited Gatto Column #12, Lines 50-65 as anticipating claim 20 element "wherein processing the time series with each member of the useful group of sets of trend determination parameters to generate a set of trends and trend attributes for each member further comprises for each member applying the trend determination parameters to at least a portion of the time series data elements, thereby generating at least one trend and at least one trend attribute parameter; and identifying the dynamic trend and at least one dynamic trend attribute parameter; and storing at least one dynamic trend attribute parameter on the computer."

In this section, Gallo describes clusters, how they are displayed, and how clusters could be formed from a combination of dates, analysts, cluster mean, and cluster standard deviation. He does mention the word "trends" in this section, but it is only in reference to qualitatively identifying trends from the displayed information.

Otherwise, there is nothing in this section that would constitute selecting a group of trend determination parameters.

The current patent application describes calculating and storing one or more trend attribute parameters on the computer. Because Gatto has nothing to do with trends, the applications are different. The current patent application specifically describes to the calculation, storage, and retrieval of trends, trend attributes, and trend attribute parameters.

Claim 21

30. The examiner has previously cited Gatto Column #12, Lines 50-65 as anticipating claim 21 element "wherein applying the trend determination parameters to at least a portion of the time series data elements thereby generating at least one trend and at least one trend attribute parameter further comprises: assigning each of the data elements to at least one trend by generating a first trend with at least a portion of the data elements; identifying the first trend as the current tend (sic); evaluating each subsequent data element to determine whether the data element is a continuation of the current trend, and assigning the data element to the current trend if it is a continuation of the current trend, and assigning the data element to a new trend if it is not a continuation of the current trend, and identifying the new trend ms (sic) the current trend; and determining at least one trend attribute for each trend."

In this section, Gatto describes clusters, how they are displayed, and how clusters could be formed from a combination of dates, analysts, cluster mean, and cluster standard deviation. He does mention the word "trends" in this section, but it is only in reference to qualitatively identifying trends from the displayed information.

There is nothing in this section related to calculating trends, trend attributes, or assigning data elements (numbers) to be associated with a particular trend.

Claim 22

31. The examiner has previously cited Gatto Column #14, Lines 5-30 as anticipating claim 22 element "wherein generating a first trend with at least a portion of the data

elements further comprises: recalling the first trend determination parameter, the data window size, from the set of trend determination parameters; forming a proposed trend data set by selecting a number of data elements from the time series, such that the number of data elements selected is at least as large as the value of the data window size trend determination parameter; calculating a first best-fit curve through the proposed trend data set; and identifying the best fit curve as the first trend."

Gatto describes Figure 11 and how the user might select different time frames of the data to show. He is describing how an *optional* chart of stock prices could be displayed along with the analysts' estimates in a graphical format. He also describes how the user might select options to save the data to a file or print the chart.

Gatto's patent generally refers to displaying the data, analysts' estimates, and other information for a ***single*** stock at a time.

There is nothing in this section related to calculating trends, trend attributes, or assigning data elements (numbers) to be associated with a particular trend.

Claim 23

32. The examiner has previously cited Gatto Column #12, Lines 35-50 as anticipating claim 23 element "wherein evaluating each subsequent data element to determine whether the data element is a continuation of the current trend is further comprises: forming a proposed trend data set from the selected data elements; calculating a new best-fit curve through the proposed trend data set; calculating at least one measure of predictive error for the new best-fit curve with respect to the values of the data elements in the proposed trend data set; projecting the best-fit curve to the location of the subsequent data element; evaluating the deviation of the subsequent data element from the projected best-fit curve value at the new location; and applying at least one acceptance criteria to the measure of predictive error, and if the acceptance criteria is met setting the subsequent data element to the proposed trend data set, identifying the

new best-fit curve ms (sic) the current trend, and if the acceptance criteria is not met setting the subsequent data element to a new trend set, determining a new trend, and identifying the new trend as the current trend."

In this section, Gatto is describing Figure 9 and the process of displaying a previously calculated model with analysts' estimates. It allows the user to "analyze, test, and compare the results of the selected model with the selected analysts, consensus and other estimates or other information". He goes on to describe how a user might select a model, how the value of the model on a given date will be displayed, and some simple statistics of the model compared to the mean of the analysts' estimates are displayed.

The models that Gatto is referring to are models of one or more analysts' estimates of earnings for a given stock. Gatto has nothing to do with determining whether a subsequent data point is a member of a trend or not. It has nothing to do with fitting a best-fit polynomial to a portion of a time series; defining an acceptance criteria whether the new data elements is a member of a trend or not; setting the element to the existing trend; or generating a new trend.

Claim 24

33. The examiner has previously cited Gatto Figure 34 as anticipating claim 24 element" wherein calculating at least one measure of predictive error for the new best-fit curve with respect to the values of the data elements in the proposed data set further comprises evaluating the derivative of the best-fit curve; obtaining an estimated value of the best-fit curve at the new element; calculating the residuals between the proposed trend data set and the new best-fit curve; normalizing the residuals; quantifying the spread of the distribution of the normalized residuals; calculating the deviation of predicted trend value at the new element from the actual value of the new element; and normalizing the deviation of predicted trend value at the new element

from the actual value of the new element using the spread of the distribution of normalized residuals."

Gatto's Figure 34 is of the estimated number of days prior to an event versus the error relative to the consensus of analysis for earning's estimates.

There is very little in Gatto's patent that has anything to do with trends. Gatto's Figure 34 is not relevant to this claim. He does not calculate trends, nor does he use them.

Claim 25

34. The examiner has previously cited Gatto Column #39, Lines 12-65 as anticipating claim 25 element "wherein applying at least one acceptance criteria to the measure of predictive error further comprises: designating a first test criterion as true if the sign of the derivative of the trend curve generated through the proposed trend dataset changes compared to the sir (sic) of the derivative of the trend curve generated previously; designating a second test criterion as true if the absolute value of the normalized deviation exceeds the deviation limit parameter; designating a third test criterion as true of the absolute value of normalized deviation exceeds the deviation limit parameter and the normalized deviation is in the opposite direction oes (sic) the direction of the trend as designated by the derivative of the trend curve through the proposed trend dataset; designating a fourth test criterion as true if the correlation coefficient between the proposed trend curve and the proposed trend data set decreases below the correlation limit parameter; designating a fifth test criterion as true if the number of times that the absolute value of normalized deviation exceeds the deviation limit parameter; and the normalized deviation is in the opposite direction as the direction of the trend as designated by the derivative of the trend curve through the proposed trend dataset; exceeds the number of values parameter; designating a sixth test criterion as true if the absolute value of the normalized deviation from a flat trend exceeds the flat trend deviation limit; and determining

whether at least one of the first, second ,third, fourth, fifth, and sixth test criteria is true."

This section describes the method of calculating the bias error between the analysts' estimates and the consensus estimate of earnings.

This section is not relevant to calculating trend parameters, trend results, or any other measure of trends.

In the current patent application, an acceptance criteria is applied to determine whether a new data point is a continuation of a trend or not. Various acceptance criteria can be used for a variety of applications. The acceptance criteria under claim 25 refers to determining whether a new data point is a continuation of a trend or not on a series of numbers in time or space.

Applicant respectfully argues that all pending claims are in condition for allowance.

Dated: September 22, 2009

Respectfully submitted,

/Rick B. Yeager/

Rick B. Yeager
Attorney at Law
10805 Mellow Lane
Austin, Texas 78759
Registration No. 39,434
Telephone (512) 918-1237
Facsimile (512) 918-1238
No. Of Application 09/815,360

CLAIMS APPENDIX

The following are the claims on appeal:

CLAIMS LISTING

1. (Previously Amended) A computer system or breaking a time series into a plurality of discontinuous trends, the system comprising:

an input means for inputting time series data to a computer, the time series comprising a plurality of data elements, at least a portion of which represents a trend which is generally increasing or decreasing;

a memory means for storing the time series data;

a processing means for

selecting a plurality of sets of trend determination parameters for the time series, each set of trend determination parameters comprising at least one window size, such that the window size defines a number of adjacent data elements from the time series to be used to generate trends;

selecting a useful group of sets of trend determination parameters for the time series from the plurality of sets of trend determination parameters, such that the useful group of sets includes at least one member;

processing the time series with each member of the useful group of sets of trend determination parameters to generate a set of trends and trend attributes for each member;

evaluating the trend attributes for each member;

selecting at least one set of trends; and

an output means for outputting the set of trends from the computer.

2. (Previously Amended) The system of claim 1 wherein the processing means further comprises

deciding, based on the composite results of a plurality of the members of the useful group of sets of trend determination parameters, whether the newest data element of the time series represents a continuation of a trend, such that the trend is increasing, decreasing, or flat.

3. (Previously Amended) The system of claim 1 wherein inputting time series data to a computer further comprises

inputting a plurality of time series data sets to the computer; and

selecting a particular time series from a plurality of time series data sets.

4. (Previously Amended) The system of claim 1 wherein inputting time series data to a computer further comprises

inputting a plurality of vector datasets to ~~a~~ the computer; and

selecting a particular vector data set from a plurality of time series data sets.

5. (Previously Amended) The system of claim 3 wherein selecting a particular time series from a plurality of time series data sets further comprises

for each of the plurality of time series data sets:

selecting at least a portion of the elements in the data set to create a selected data subset;

normalizing the selected data subset to generate a normalized subset for the time series;

storing the normalized subset on the computer;

calculating, on a processor, the slope of a best-fit polynomial regression through the normalized subset; and

selecting a particular time series that has a large absolute slope and a large correlation coefficient between the trend and the data elements.

6. (Previously Amended) The system of claim 1 wherein the processing means further comprises

specifying a range of values for each of a plurality of trend determination parameters; and

generating the sets of trend determination parameters by selecting unique combinations of trend determination parameter values, such that the values are within the range of values for each of the plurality of trend determination parameters.

7. (Previously Amended) The system of claim 6 wherein specifying a range of values for each of a plurality of trend determination parameters further comprises

specifying a minimum value for a first trend determination parameter of initial data window size;

specifying a maximum value for a first trend determination parameter of initial data window size;

specifying a minimum value for a second trend determination parameter of deviation limit; and

specifying a maximum value for a second trend determination parameter of deviation limit.

8. (Previously Amended) The system of claim 1 wherein the processing means further comprises

specifying a range of potential values for each of a plurality of trend determination parameters;

creating an objective function from at least one indications of trend results, such that the objective function generates a resultant value for a set of trend determination parameters; and

selecting a useful group of sets of trend determination parameters by applying an optimization procedure to the objective function and the range of potential values for each of the plurality of trend determination parameters.

9. (Previously Amended) The system of claim 1 wherein selecting a useful group of sets

of trend determination parameters for the time series from the plurality of sets of time series parameters further comprises

for each trend determination parameter set:

applying the trend determination parameters to at least a portion of the time series data elements, thereby generating at least one trend and at least one trend attribute parameter;

identifying the dynamic trend and at least one dynamic trend attribute parameter.

calculating at least one indication of trend results between the time series and the trend set; and storing at least one indication of trend results on the computer; and

selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets.

10. (Previously Amended) The system of claim 9 wherein applying the trend determination parameters to at least a portion of the time series data elements thereby generating at least one trend and at least one trend attribute parameter further comprises

assigning each of the data elements to at least one trend by generating a first trend with at least a portion of the data elements;

identifying the first trend as the current trend;

evaluating each subsequent data element to determine whether the data element is a continuation of the current trend, and assigning the data element to the current trend if it is a continuation of the current trend, and assigning the data element to a new trend if it is not continuation of the current trend, and identifying the new trend as the current trend; and

determining at least one trend attribute for each trend.

11. (Previously Amended) The system of claim 9 wherein calculating at least one indication of trend results between the time series and trend set further comprises

calculating at least one measure from the group consisting of: the number of trends in the subset of the time series, the RMS Error between the input data values and trend values, the average trend length; the average trend length divided by the minimum number of data points needed to define a trend (window size

parameter), the average percent return of the trends, the summed cumulative percent return of the trends; the fraction of correct predictions, the fraction of incorrect predictions, the quotient of the root mean square error and the average length of the trends divided by the minimum number of data points needed to define a trend, and the RMS error*L_s the efficiency of the trends, where efficiency is defined as the average return of the trends divided by the average length of the trends, and compounded return of the trends.

12. (Previously Amended) The system of claim 9 wherein selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and its associated trend results, where a first axis represents a first measure of trend results and a second axis represents a second measure of trend results; and

selecting from the graph at least one data point that represents a trend determination parameters set that has desirable trend results.

13. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the product of the root mean square error and the deviation limit for the set of trend determination parameters, and the x-axis represents the average trend length for the set of trend determination parameters; and

selecting at least one set of trend determination parameters associated with a point from the graph that has a minimum value for the product of the root mean square

error and the deviation limit for a given average trend length .

14. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the root mean square error for the set of trend determination parameters, and x-axis represents the average trend length for the set of trend determination parameters; and

selecting at least one set of trend determination parameters associated with a point from the graph that has a minimum value for the root mean square error for a given average trend length.

15. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the summed cumulative percent return of the trends for the set of trend determination parameters, and x-axis represents the average percent return for the set of trend determination parameters; and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the summed cumulative percent return and the average percent return.

16. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the summed cumulative percent return of the trends for the set of trend determination parameters, and x-axis represents the fraction of correct predictions for the set of trend determination parameters; and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the summed cumulative percent return and the fraction of correct predictions.

17. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the average percent return of the trends for the set of trend determination parameters, and x-axis represents the fraction of correct predictions for the set of trend determination parameters; and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for both the average percent return and the fraction of correct predictions.

18. (Previously Amended) The system of claim 12 wherein plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters and their associated trend results and selecting from the graph at least one

data point that represents a parameters set that has desirable trend results further comprises

plotting on a graph a representative data point for each of the plurality of sets of trend determination parameters, where the y-axis represents the average percent return for the trends for the set of trend determination parameters, and x-axis represents the average trend length for the set of trend determination parameters; and

selecting at least one set of trend determination parameters associated with a point from the graph that has a maximum value for the average percent return for a given average trend length.

19. (Previously Amended) The system of claim 9 wherein selecting at least one set of trend determination parameters based on at least one indication of trend results for each of the sets further comprises

specifying an objective function that incorporates at least one measure of trend results, such that minimization of the objective function produces desirable trend results; applying an optimization technique to the objective function such that the optimization technique minimizes the objective function; and

selecting at least one set of trend determination parameters as a result of minimizing the objective function.

20. (Previously Amended) The system of claim 1 wherein processing the time series with each member of the useful group of sets of trend determination parameters to generate a set of trends and trend attributes for each member further comprises

for each member applying the trend determination parameters to at least a portion of the time series data elements, thereby generating at least one trend and at least one trend attribute parameter; and

identifying the dynamic trend and at least one dynamic trend attribute parameter; and

storing at least one dynamic trend attribute parameter on the computer.

21. (Previously Amended) The system of claim 20 wherein applying the trend determination parameters to at least a portion of the time series data elements thereby generating at least one trend and at least one trend attribute parameter further comprises

assigning each of the data elements to at least one trend by generating a first trend with at least a portion of the data elements;

identifying the first trend as the current trend;

evaluating each subsequent data element to determine whether the data element is a continuation of the current trend, and assigning the data element to the current trend if it is a continuation of the current trend, and assigning the data element to a new trend if it is not continuation of the current trend, and identifying the new trend as the current trend; and

determining at least one trend attribute for each trend.

22. (Previously Amended) The system of claim 21 wherein generating a first trend with at least a portion of the data elements further comprises

recalling the first trend determination parameter, the data window size, from the set of trend determination parameters; forming a proposed trend data set by selecting a number of data elements from the time series, such that the number of data elements selected is at least as large as the value of the data window size trend determination parameter;

calculating a first best-fit curve through the proposed trend data set; and

identifying the best fit curve as the first trend.

23. (Previously Amended) The system of claim 21 wherein evaluating each subsequent data element to determine whether the data element is a continuation of the current trend further comprises

forming a proposed trend data set from the selected data elements; calculating a new best-fit curve through the proposed trend data set; calculating at least one measure of predictive error for the new best-fit curve with respect to the values of the data elements in the proposed trend data set; projecting the best-fit curve to the location of the subsequent data element;

evaluating the deviation of the subsequent data element from the projected best-fit curve value at the new location; and

applying at least one acceptance criteria to the measure of predictive error, and if the acceptance criteria is met, setting the subsequent data element to the proposed trend data set, identifying the new best-fit curve as the current trend, and if the acceptance criteria is not met, setting the subsequent data element to a new trend set, determining a new trend, and identifying the new trend as the current trend.

24. (Previously Amended) The system of claim 23 wherein calculating at least one measure of predictive error for the new best-fit curve with respect to the values of the data elements in the proposed data set further comprises

evaluating the derivative of the best-fit curve;

obtaining an estimated value of the best-fit curve at the new element; calculating the residuals between the proposed trend data set and the new best-fit curve;

normalizing the residuals; quantifying the spread of the distribution of the normalized residuals;

calculating the deviation of predicted trend value at the new element from the actual value of the new element; and

normalizing the deviation of predicted trend value at the new element from the actual value of the new element using the spread of the distribution of normalized residuals.

25. (Previously Amended) The system of claim 23 wherein applying at least one acceptance criteria to the measure of predictive error further comprises

designating a first test criterion as true if the sign of the derivative of the trend curve generated through the proposed trend dataset changes compared to the sign of the derivative of the trend curve generated previously;

designating a second test criterion as true if the absolute value of normalized deviation exceeds the deviation limit parameter;

designating a third test criterion as true if the absolute value of normalized deviation exceeds the deviation limit parameter and the normalized deviation is in

the opposite direction as the direction of the trend as designated by the derivative of the trend curve through the proposed trend dataset;

designating a fourth test criterion as true if the correlation coefficient between the proposed trend curve and the proposed trend dataset decreases below the correlation limit parameter;

designating a fifth test criterion as true if the number of times that the absolute value of normalized deviation exceeds the deviation limit parameter; and the normalized deviation is in the opposite direction as the direction of the trend as designated by the derivative of the trend curve through the proposed trend dataset; exceeds the number of values parameter;

designating a sixth test criterion as true if the absolute value of the normalized deviation from a flat trend exceeds the flat trend deviation limit; and

determining whether at least one of the first, second, third, fourth, fifth, and sixth test criteria is true.

EVIDENCE APPENDIX

None

RELATED PROCEEEDINGS APPENDIX

None